The Future Operating Environment 2050: Chaos, Complexity and Competition

By **Kimberly Amerson** and **Spencer B. Meredith III**

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The end of the Cold War brought the expectation that the world would cease teetering on the brink of existential annihilation, and the optimistic hope of a better world was cautiously balanced by precarious uncertainty. However, the emerging world proved to be a combination of international rivalries, non-state actors leveraging power asymmetrically, and challenges to traditional politics. In addition, advances in science and technology impacted the shifting political landscape in significant ways. Technologies that allowed people to connect globally, migrate more easily, compete for resources, led to the diffusion of centralized power and shifting traditional identities. These significant shifts make it worthwhile to reflect on the character of warfare and the expected changes that currently evolving trends will have on the future battlefield. Foremost, is the question: how should the world be understood when viewed through the lens of the U.S. Army's 241-year history of planning for combatting peer competitors, like Russia and China?

On the one hand, great power competition defined the 20th Century, which reinforced a posture and readiness to fight a conventional war. This readiness is still esteemed as quintessential to American power projection, the guarantee of security for U.S. partners and interests abroad, and protection of the homeland. While the scenario of a large scale conventional war remains a potential threat, the nature of U.S. involvement in conflict over the past 25 years has involved more ambiguity and less clarity in terms of geographic lines of control, or clear, singular enemies with equally clearly defined objectives. The realized threats and conflicts have involved unconventional, asymmetric warfare waged by enterprising individuals and groups in shifting alliances. This environment is characterized by complexity, chaos and competition.

Such a complex environment has created Gray Zones. Gray Zones are spaces between outright war and peace, where diverse types and numbers of actors compete for resources, access, territory, and power within states and across them. [1] While the combination of structural, systemic constraints and opportunities for actors to have agency are nothing new, Gray Zones present a challenging context for the U.S. military and will continue to do so in large part due to specific evolving trends.[2] This paper explores how specific expected future trends will impact U.S. hegemony and the U.S. Army in particular as it confronts familiar rivalries and emerging competitors in the Future Operating Environment. Maximizing opportunities to compete in Gray Zones through a significant paradigm shift in calculating the strategic value of U.S. involvement in conflicts and capitalizing on U.S. military strength through

unconventional applications will allow the U.S. to remain competitive moving into 2050.

Several core principles should guide the analysis of a potential world in 2050, even before considering the emerging data. First, the very core of political action is underlined by human nature, which has not changed in recorded history. While the form of events, the actors who shape them, and the specific locations where they occur will change over time, the basic principles of Maslow's hierarchy of needs still guides what people want, and how they order their preferences. This offers ways to contextualize actor's decisions moving into the future. Accordingly, those interests are first and foremost personal, communal and locally based. Further, without regulation, these needs will lead to conflict and usurp all efforts to transcend personal gain for common good. Even in a modern environment, when a sense of community and personal identity have global connections, the sense of an "in-group" vs. the other "out-group" persists.

Second, the pace of information processing has undoubtedly increased, but the perception of that speed is not new. Late 19th century Europeans had a similar sense of rapidly changing forms of communication, commerce, and development as a result. So while the size, speed, and type of increase in technology precipitates change, the perceptions of those changes matter as well.

Third, nation states became the dominant political structure over the past four centuries for a reason: by comparison, they had the greatest capacity to concentrate wealth and build identities that bound citizens to their causes. While those capacities appear under threat from multi-national corporations, non-state groups, and the appearance of superabundant "people power" on social media, the state remains a potent force moving into the future because the configuration of power available to humanity – military, economic, information, resources – are all processed to some central degrees through states. In addition, threats to state sovereignty are not new; the British East India Trading Company was able to influence state policy for centuries. However, these types of entities required support, protection, and ultimately permission from states to operate.

In addition, legal structures enshrine the prerogatives to nation states, and as the beneficiaries of a state-centric status quo, the likely change to a fundamentally different structure of global and local politics is low for the foreseeable future. The use of "lawfare" confirms this trend. However, the caveat to this centralization of the state is that leveraging large standing armies against asymmetric threats is not an effective tactic for achieving strategic success. Usually this type of application results in the decimation of the objective, while the underlying ideologies, mindsets and grievances of the opposing group are not assuaged, but rather fueled and intensified.

Yet despite these aspects of continuity in the global context, there are emerging trends that call for attention because of their disruptive potential. Drawing on cumulative work found in sources across the U.S. Intelligence Community, U.S. Department of Defense, United Kingdom's Ministry of Defense, and both conventional and special operations elements of the U.S. Army on likely estimates of the Future Operating Environment, this paper highlights four major trends. These trends include (1) *technology evolutions*; (2) *resource competition[3]* between and within states and regions; (3) *shifting demographics*; and (4) *power diffusion.* While none of these trends can be unequivocally linked to a certain outcome, they are certain to shape the Future Operating Environment of 2050.

Technology Evolution

Technology evolves in terms of the pace of change, advancement of processing and computing applications, and dispersion of technology to both traditional centers of power and outwards to "the people." Subfields within this trend that will likely impact the Future Operating Environment include the rise of cyberwarfare against states; cybercrime against corporate and personal entities; as well as the social

and economic changes brought on by virtual connections that augment if not replace physical, "real" relationships.

The rate at which technology is evolving and is absorbed into use by the population is growing exponentially. Starting with the advent of electricity in 1873, nearly 46 years passed before 25% of the U.S. population utilized this new technology. This was in large part because the *speed* of change from the profit-seeking standpoint of utility producers ran up against the *drag* of government and public infrastructure slowing the diffusion. Then with fewer and smaller scale changes needed to implement them broadly, mobile phones took only 13 years to achieve the same end, and only seven years to achieve 25% absorption of the World Wide Web within the U.S.[4] The Apple iPhone launched in 2007, selling six million units in one year in four countries, and yet, the iPhone 3G launched in 2008, selling ten million units in five months worldwide. [5] This speed of technology diffusion was a result of technology pushing industry to evolve web access to accommodate the advent of these new web-enable smart phones. This points to a continued rise in technological adoption through increased development and decreased costs, and more capacity to overcome infrastructural drags when present. This ability to overcome infrastructure drag coupled with increasing demand for technology, leads to the realistic assessments that such technology hunger and fulfillment will continue to increase into 2050 and beyond.

Advanced Applications

Technology evolution also includes the application of more capable advancements in smaller, more complex, integrated systems. Nano robotics, "smart dust", and swarming Unmanned Aerial Vehicles (UAVs) are all part of this evolving category, [6] however their importance is highlighted because of the changes they force on the political landscape towards evolving the character of warfare. These advancements also highlight as technology moves forward, integration will be as important as innovation. [7] Decreased size will increase technological capacity through portability and an expanded range of applications. These efficiencies will allow more technological innovations to be utilized simultaneously, increasing the ability to process and absorb information, leading to an increasingly complex *Internet of Things*. However, as current progress has demonstrated, increasing connectivity and integration will not change basic human nature; the increasingly complex political landscape will still be shaped by Maslow's hierarchy of needs. Additionally, the integration of diffused technology expansion will be limited by infrastructural constraints and data storage capacities at some point and to some degree.

One area that raises multiple avenues for technology evolution is increased human-machine integration which capitalizes on the nexus of human assessment and creativity with machine capabilities. Optimized searching of massive indexes of data, exponential computing power, interactive and life-like experiences through virtual reality, all represent evolutions in the way that human-machine integration will evolve through 2050. New technologies including quantum computing, advanced physiometric and physiological interfaces with Artificial Intelligence (A.I.) technology, including autonomous robots are part of this evolution.[8] In addition, additive manufacturing (3D Printing) has begun to challenge existing manufacturing and procurement chains. It also brings with it the possibility of individual manufacturing challenging the governments attempt to regulate potential threats beyond its often contested monopoly on the use of legitimate coercive force.

Equally important to the actual technology innovations are the abilities afforded to developing countries to leap-frog technologies, industries and infrastructures through the openness of trade, capital flows, and workers. This diffusion of information power through technological advancements makes cyber conflict inevitable. This is not because cyber connectivity inherently increases adversaries' aggressive intent, but rather as the number of interests needing protection (strategic vulnerability) increases so does the opportunities for adversary's to permeate them (strategic incentives). The rise of ubiquitous information

creates new avenues for historical disputes to be advanced, necessitating greater planning in terms of defending and deterring cyber aggression by states, groups and individuals alike.

Cyberwarfare

Several trends in Cyberwarfare are alarming. Cybercrimes are not just new digital ways to ransom, blackmail or pirate information; they can be perpetrated with anonymity, and in some cases, undiscovered access. Although Cyberwarfare seems less menacing than traditional warfare because of its ethereal web-based nature, Cyberwarfare against states can include major disruptions of digitally managed key infrastructure, precipitating catastrophic economic, physical and humanitarian outcomes. U.S. prominence as a global military force does not transmit directly to cyber dominance. This is true for a variety of reasons ranging from rival groups unencumbered by legal restrictions, bureaucratic processes that slow procurement and innovation in the U.S., and manufacturing outsourcing that relies on foreign technology. This represents a lasting strategic vulnerability that requires persistent engagement as many competitors can challenge the U.S. in the Cyber domain, including individuals attacking asymmetrically.

Global Connectivity

Underlying the challenges from non-state groups and individuals, technology and globalization have created an interconnectedness of the global population that has occurred in the absence of an absolute-gains seeking context – despite the rhetoric of universality and common goods, the practice of governments and opposition groups remains fixed on their own interests. The "hypocrisy" of promised benefits running into unmet expectations for "a better life" will remain a core potential for anti-status quo groups to catalyze core grievances of disenfranchised individuals on a scale and with an ease not experienced in previous decades.

Therefore, the profusion of comparatively cheap, easy-to-operate communication devices does more than simply expose state leaders to ever-increasing pressure to defend and justify their actions; it also increases the sense of discontent by both the tone of the commentaries, and the absence of context for analysis. "Paradoxically, tools that enable populations to communicate and organize are also facilitating their fragmentation; identity-based populations quickly coalesce around perceived grievances, unencumbered by state boundaries, and enabled by instant communications."[9] Therefore, the number of voices and the options for people to express them beyond their geographically localized communities have exploded and will continue to expand with greater and greater fractionalization; this kind of "politics of division" will continue without some potentially catastrophic unifying event to reverse it. Thus, ubiquitous digital information, social media's expansion, new forms of technological currency (bitcoin) and national identities (e-citizenship) take historic trends and exponentially increase the friction and rub of perceived grievances, allowing individuals to coalesce more easily towards destructive ends.

Resource Competition

Growing populations and environmental changes will lead to resource conflict. Water, food, fossil fuels, and rare earth minerals are coming under increasing competition driven in part by resource scarcity and environmental factors, but also by shifting populations. All of these causes lead to a single conclusion that until such time as replacement sources can be found, if at all, conflict among and across populations will increase. The questions are how long these can be legally resolved or mitigated before violence breaks out, and if that violence will escalate due to spillover effects from refugee displacement, for example.

In addition to traditional conflicts over natural resources, access to ports for shipping and trade will drive conflict as sea levels rise based on predicted models.[10] Desertification of the Sahel, melting ice in the Arctic, and natural disasters that permanently alter the landscape around well-established civilizations will

drive migration, and states are already responding with increasing divisions arising in Europe, the United States, India and other regions facing refugee influxes.

It is important to note that resource competitions occur during a narrow band of time between *plenty–scarcity–replacement*. During the transition when what has been used and known to work declines, and before alternatives replace them, resource conflicts stand a good chance of increasing. Those conflicts can occur directly as with water scarcity in Syria and bread price increases in Egypt prior to the Arab Spring, or indirectly through commodity futures in the Arctic as several nations scramble to interpret existing international laws concerning undersea territories in their favor. Therefore, the biggest impact of resource scarcities will be felt prior to replacement. In places where that takes longest due to weak or unwilling states, regional competition, or even the very fact of local people using up resources for their personal needs (i.e., deforestation for cooking fires or overgrazing of pasturelands), conflicts have a higher chance of being resource driven.

Demographic Shifts

Resource competition is only one of the reasons attributed for the movement of people, yet the consensus is that people are moving towards greater concentrations of urban populations. The National Intelligence Community predicts that 2030 will be characterized by the "new age of migration."[11] Mass migration due to drought, flood, physical changes in landscapes due to climate change, political oppression, and economically-opportunistic migration are a few of the drivers. The recent mass refugee migration out of Syria is the pinnacle of prescient conflicts that have driven millions of individuals to seek new safe havens. Many who have resettled, predominantly in Europe, will reshape the landscape both demographically and economically. Although immigration can result in the blending of cultures, ethnicities, and ideologies as groups assimilate into their new region; on the other hand, disparate cultures, ethnic tensions and stigmatizing stereotypes can force people into small enclaves, pockets and neighborhoods of ethnically homogenous migrants. These isolated areas often suffer from less centralized governance benefits like law enforcement, sanitation services, and institutional education opportunities.

This potential appears in Europe where immigrants from Middle Eastern countries have certain core cultural practices that are distinct from European ones, differences that have been exacerbated by security concerns brought by radical Islamic VEOs from the region. In addition to broader integration issues, the current influx of migrants not only strains infrastructure and security apparatuses in the short-term, but has the opportunity to cause the counter-reaction of centralized nationalism. Therefore, in Europe and Russia through 2050, the rise of nationalism as a response to diaspora communities not integrating into their host societies[12] can easily push states away from the European Union (E.U.) consensus model to separate, regional treaties based more on domestic politics than international goals. The recent Brexit vote and resultant calls for "independence" votes in other parts of the United Kingdom and larger E.U. demonstrate this growing trend.[13]

Megacities

More broadly, as demographics shift locally, regionally, and globally, forecasters expect cities to grow in size and number with some becoming what is termed a megacity (>10 million people). Estimates concur that upwards of 60% of all populations will be living in megacities by 2030, and will grow to 70% by 2050.[14] However, the diversity of drivers and infrastructure available for the formation of megacities demonstrates that not all megacities fit in a "one-size-fits-all" approach to hyper-urbanization. Megacity typology is important for understanding the context of this statistic. Urban development since the industrial revolution has followed these three basic patterns: vertical cities, peri-urban, and feral cities.[15]

Vertically integrated cities with towering skylines, densely packed apartment neighborhoods, and

underground subways are often characterized by a high degree of centralized governance, and localized community cohesion along cultural or employment lines. These are cities like London or New York City. In contrast, *peri-urban cities with suburban sprawl* are characterized by smaller central areas surrounded by creeping development from the core into the semi-peripheral areas claiming more and more rural farmland. These suburban areas atomize dense urban populations into parcels that are governed by independent local infrastructure and governance. These are cities like Los Angeles and Paris. *Feral cities* are the most concerning since they grow with neither planning, nor resources. The resulting slums that form around the nucleus of an urban center often quickly become denied areas ruled by ethnic enclaves, gangs and criminal syndicates, which present a perilous labyrinth in both the tactical landscape and the human domain. These slum cities typify the worst-case scenario for megacities that are urban, complex, crowded, connected, coastal, and conflict-prone (UC5).[16] The convergence of more information, more people, and more dependence on the outside world through trade, with less community cohesion, state resources, and governance to compensate for rampant poverty, violence and pollution, is a breeding ground for discontent and anger among an increasingly aware yet still disempowered population. Again, even before considering data for specific megacities themselves, a central challenge to megacities is that perceptions of inequality will continue to rise and motivate ad hoc, violent political movements.

Diffusion of Power

Powerholders seek to expand or at least maintain the status quo, while opponents seek to opportunistically undermine and wrest it from them. The fact of hegemons and challengers is not new, but the forms and arenas for that competition will be characterized by several trends that correlate to the previous ones discussed. Expanding global economic growth, rapid development in the Global South, exploitation of technology by diverse groups, manufacturing revolutions, and new communications can lead to a rise of individual empowerment at the tactical level,[17] as well as having an impact on the strategic level. However, slowdowns can and will derail economic progress, developing sectors can be fraught with uncertainty, and single export nations are prone to instability.[18] Throughout those pendulum swings, even when the actual level of relative power held by individuals grows, more important will be the perception and expectation that such power is their right. States that withhold it, or empower economic and social elites who prevent its diffusion to the population, will easily become vilified in the public domain, leading to greater instability domestically and internationally.

One form of this is the potential for technology-empowered individuals no longer bound by strict mindsets of local hierarchies and loyalty to physical places, to become self-actualized by their "e-identities." The key determining factor will be the ability of states and existing international institutions to channel those individuals, harness mass messaging, and deflect criticism through various scapegoat tactics to preserve status quo structures. Most importantly, challenges to the agents in the structures of power do not equate to challenges to the structures themselves. If history is a guide, post-colonial sub-Saharan Africa, Russia, China, and even Mexico and the U.S. have all preserved a class of abiding elites, even when the members change. This will likely continue into the future, barring some catastrophic collapse of either the global economy, U.S. military primacy, or Europe as a peaceful interstate community.

Thus although states will continue to maintain the primary political space into 2050, there are likely to be non-state actors, international organizations and even "super-empowered individuals" that will contest states' power to influence and shape global politics and conflicts.[19] "Super-empowered individuals," like Bill Gates through his foundation, are those with broad global portfolios and deep national influence, who can leverage both to shape the landscape for their investments. However, as discussed, these individuals will still have to compete with the state's prominence and policies against their self-enterprising; otherwise, violence against the state will continue to be met by violence.[20] The proffering trend will be one of contested diffusion of power with non-state entities challenging states for primacy, rather than a collapse of state power all together. Thus states will be forced to adapt to more complexity,

influencers, and actors in the political landscape.

Impacts for the U.S. Hegemony

The shifts presented in these major trends set the stage for upcoming decades. The U.S. currently faces challenges to its two-decades of global hegemony, giving rise to disputed primacy economically, diplomatically and likely militarily in the future. The consequences of these trends will be continued contestation by traditional rivals, with increasing challenges from non-state actors and super-empowered individuals, that are both empowered by and seeking to manage "people power" – the rhetoric of populism will long endure. Local identities will endure as well, and even cosmopolitan perspectives will continue to take on an "us vs. them" flavor. The convergence of many of these future trends manifests as "identity-based turbulence"[21] that will emerge as extreme religious, nationalistic, or cause-focused groups funnel trans-regional support to ideologically driven-conflicts. Decentralized conflicts will occur within, among and across borders catalyzed by a super-connected strata of web-enabled devices. From a nation-state perspective, increased chaos and conflict will force the U.S. to make careful choices to achieve foreign policy goals directed by national interests, loosely defined as extended deterrence, or by maintenance of global hegemony at all costs. This paper suggests the latter is untenable for 2050. Political partisanship, increasingly sharp social cleavages, and rising perceptions of income disparity all shape the type of strategic vision possible for the U.S., and appear to limit a maintenance of the status quo.

Therefore, seeking efficiencies within the system that can apply the right solution to the right problem at the right time will require more than a whole-of-government approach; they require a paradigm shift to embark on only the most prudent endeavors out to 2050. Divisions in Europe, the resurgence of global power politics that coincides with more diverse and potent non-state actors and potential threats, megacities, and implications of failed or failing cities as a subset of failed or failing states, are part of a growing list of complex problems. All these indexed issues pose a significant security and governance challenge, and economic threat to the U.S. as a dominant global power. This complex environment requires deterrent and nuanced military approaches to compete in the Gray Zone, prevent conflicts where possible, and keep others manageable, or winnable when not.

Impacts for the U.S. Army

The consequences of these future trends have specific impacts for the U.S. Army. The rapid development of technology will make direct, "tit for tat" overmatch strategies fiscally unsustainable as the exclusive or even primary means of deterring rivals.[22] The rate by which technological evolutions can be implemented to achieve overmatch will become increasingly prohibitive because the procurement process contains an inherent lag between identification of a required capability and the implementation of resources. Funding the optimal tech solution today does not guarantee that it will remain so, and in fact it may be surpassed by the time of its implementation. The opportunity to moderate this dilemma exists in the use of lateral overmatch strategies that leverage technology in unanticipated ways to counter otherwise superior systems. In addition, creative applications of baseline modular technology that is adaptable, interoperable and upgradable can provide an alternative for the fiscal challenge of overmatch competition. [23]

Even more so, the change of population dynamics and demographics also shows that the third off-set strategy will not be capable of deterring most of the types of problems and conflicts that will require U.S. Army involvement moving into the future. As individuals move to cities, unoccupied or uninhabitable land between cities will be less strategic than the impacts of influence operations in and around the cities, as well as within populations as the arena for applications of unconventional, special warfare specific missions. The "environment will be defined by the intermingling of friends, enemies and neutral parties"

that highlights the critical, nuanced understanding of social, cultural, interactive networks that will be as "important as the weapons we employ."[24] Taking and holding massive swaths of land will continue to be less frequently utilized than nuanced maneuvering within and among populations in crowded, technology enriched labyrinths within megacities. However, this does not mean the reduction of conventional capabilities per se; deterring great power rivals will remain a top priority. The U.S. military will also be required to preserve freedom of navigation to ensure continued protection of trade routes, and ensuring U.S. interests are broadly protected from peer competitors who have the potential to quickly disrupt the global balance and spread conflict throughout the Gray Zone. Therefore, robust, credible deterrence by a strong, capable and standing U.S. Army remains a necessity. The question is how to utilize existing and approved materiel, programs, and personnel into a more "comprehensive deterrence" strategy.[25]

The U.S. military is at a strategic inflection point that requires a significant paradigm shift in order to remain a preeminent force. To understand the nuance of this shift from the pre 9/11 landscape to the current application in the Gray Zone and moving into 2050, the U.S. Army should be utilized within a whole of government approach to allow the U.S. to leverage all applicable tools and functions within its power to *change the calculus* and *shape the landscape* upon which its competitors make decisions. This is a shift from the pre-9/11 or even Cold War deterrence that was focused on deterring an enemy from acting with higher and higher stakes. The Army in particular will need to see accurately the emerging complexity within the operating environment, grasping nuances between actors and the 2nd and 3rd order effects for any action.[26] Efficient use of resources, and understanding how nations with smaller GDPs compete with the U.S. in both traditional militarization as well as development of asymmetric capabilities, matter greatly in that process. This perspective will aid in allowing the U.S. Army to be employed most effectively in the future operating environment.

In addition to appreciating the complexity of the fluid system in which it is operating, the U.S. Army may be employed in conventional and unconventional ways moving out to 2050. First, physical domination strategies will hold a vital role in securing known borders, providing access, and deterrence whether in Eastern Europe or the South China Sea. Second, small sets of soldiers will engage in tactical conditions mired by complexity with multiple actors attempting to influence the outcomes on missions that are focused on special warfare operations. Combined conventional and special operations forces should be employed in tandem to execute operations that maximize strategic outcomes, reflecting a high magnitude of interoperability, integration and interdependence, to maximize its economy of force and achieve favorable outcomes. These mission sets will continue to include stabilization operations, bolstering legitimate governance, building partner capacity, increasing security operations, influence operations, civil-military operations and humanitarian relief. This human-dominated environment is best maneuvered by well-trained, educated and decentralized individuals integrated into the populations. As conventional Army Armor and Infantry Soldiers have mastered maneuver and terrain capture, U.S. Army Special Operations Forces (ARSOF) are masters of this human domain environment. Given limits to ARSOF's size and the proven success of the U.S. Army to engage in several of these mission sets over the past 15 years, these suggest that a "whole-of-Army integration" expanding the Army's engagement role both in and among populations will be prescient for the emerging complex, chaotic world. Moving forward, creating interoperable assets and integrating tactical-to-strategic mission sets will be key, as rivals, threats, and enemies seek to do the same. *Integration*, *Interoperability* and *Interdependence* are at the heart of preserving U.S. security into 2050.

To do so, current educational models include and should expand the focus on the human domain as a lowest cost, high value arena for any units engaging with host nation forces, resistance movements, and target populations.[27] Several context competencies (*cultural empathy* to identify with and understand

"the other"; *comparative politics* to understand the structures and agents at play in the environment; and *conflict resolution* to prevent, diffuse and mitigate violence when possible) should play a role in shaping Army paradigms. In addition, a core capacity for long-term perspectives of the Army and its capabilities rests with *enlisted strategic leaders* (senior Non-Commissioned Officers) as interpreters and implementers of the Commander's intent from the tactical through strategic levels. These complement other physical means (*personnel, materiel, and logistics*) as well as political efforts to *define the strategic options for the government* while *enacting strategic vision from the government*.

Conclusion

If the conflicts in Iraq and Syria are harbingers of future conflicts, Soldiers will need to maneuver in densely-crowded, increasingly complex, technologically-connected cities in urban guerilla warfare, while focusing on the human domain, influence, and cyber operations. Physically taking a town by force, clearing buildings block by block will remain necessary, as seen by Brazil's recent efforts to securitize *favelas* in preparation for the World Cup and Olympics. However, as examples of Ramadi, Fallujah, and Mosul demonstrated, in some cases these tactics are not enough; physical domination alone does not translate to success in the cognitive or cyber domain.[28] Thus, the Army needs to develop capabilities and partnerships that will allow for integrated combined maneuver in all these additional battlegrounds. The U.S. Army of 2050 will be required to engage in human-centric problems, being able to utilize well-educated, specialty-specific professionals that will achieve definitive effects for strategic success on the physical, cognitive and cyber battlefields of the future. The Future Operating Environment of 2050 could be best met by an integrated methodology that utilizes flexible and creative approaches, lateral overmatch and an appreciation of the complexity of the global ecosystem. To meet the evolving threats, current projections suggest utilizing prudent investments of U.S. Army forces in unconventional ways that are integrated into a whole of government structure. The U.S. Army should capitalize on every opportunity to leverage the future trends and competition in the Gray Zone in ways that allow it to keep a strategic advantage moving into 2050.

The opinions expressed here are the sole ownership of the authors, and do not reflect those of the U.S. Army Special Operations Command, National Defense University, the U.S. Army, the Department of Defense, or the U.S. Government.

End Notes

[1] The Gray Zone, CAPT Phillip Kapusta, published by US Special Operations Command (2016), outlines the concept of competition among actors in the space between peace and war.

[2] Although, Gray Zones are not a new phenomenon, increased awareness has allowed it to become more prevalent in planning models.

[3] The lack of fundamental breakthroughs in energy sources remains a drag on the impact of fundamental technological revolutions, thereby relegating changes to what is most commercial desirable and political viable.

[4] National Intelligence Council (NIC), *Global Trends 2030: Alternative Worlds* (Washington DC: Office of the Director of National Intelligence, 2012), 2.

[5] Ritchie, Renee. 2015. "History of the iPhone: Apple Reinvents the Phone." *iMore Blog*. 2015,

http://www.imore.com/history-iphone-original; Brian X. Chen, "January 27, 2009: iPhone, Your phone, we all want an iPhone." *Wired Magazine,* June 29 2009, **http://www.wired.com/2009/06/dayintech_0629/**

[6] United Kingdom, Ministry of Defense (U.K. MOD), *Development, Concepts and Doctrine Centre's (DCDC) Strategic Trends Programme: Future Operating Environment 2035 (FOE 2035)* (Shrivenam: Crown Publications, 2015).

[7] The strategic calculation for the synergistic effects of integrated systems rules out the plateauing of technology evolution based on a single measurement such as miniaturization of size or capacity.

[8] Ibid.

[9] U.S. Special Operations Command, *Strategic Appreciation: Finding Balance in a Shifting World,* Dec 2015

SASOCpaper,eterrence, April5. Sg Worldntf National Intelligence, 2012).ated systems rules out the plateuing

[10] Laying aside the debates about exact levels, the perception of anticipated changes is enough of a driver for conflict between and within states so that the issue raises yet another contested zone in the future.

[11] NIC, *Global Trends 2030: Alternative Worlds*, p. 24.

[12] Nicholas Nassim Taleb, discusses the "one-way minority," whereby small groups have preferences that demand more restrictions, specifically through some measure of linguistic, dress, religious, and food accommodation by both immigrants and long-standing resident communities, than the majority's. This pushes the minorities preference on the majority. The inverse of this one-way minority is the pushback of nationalism that refuses the accommodation, ostracizing and rejecting the minority.

[13] Russia stands to gain from this potential strategic trend as it would weaken the E.U. as an institution, mitigate Russia's strategic vulnerability to energy markets in Europe, and diminish the collective defense afforded by the E.U. that seemed to be encroaching its periphery.

[14] NIC, *Global Trends 2030: Alternative Worlds* and U.K. MOD FOE 2035.

[15] NIC, *Global Trends 2030: Alternative Worlds*, p. 29, and U.S. Army Special Operations Command (USASOC), Army Special Operations Forces 2022: Future Operating Environment, 2012, p. 17.

[16] The concept UC3 (Urban, Crowded, Connected, Coastal) comes from David Kilcullen's *Out of the Mountains*: The Coming Age of Urban Guerillas, (2013) with the specific term coined by Dr. Russ Burgos. However, since that publication, several other "C's" have described this environment including: contested, conflict-prone, complex, crowded.

[17] NIC, *Global Trends 2030: Alternative Worlds*

[18] "Human Factor Considerations for Undergrounds in Insurgencies," found in Assessing Revolutionary and Insurgency Strategies, USASOC, 2013.

[19] NIC, *Global Trends 2030: Alternative Worlds*

[20] A glimmer of this shifting landscape emerged in the stalemate between Apple, Inc. and the U.S. Federal Bureau of Investigations over the request to hack into an Apple iPhone to aid in a federal terrorism investigation, a contest that Apple won but only after an organ of the state – the judiciary – legitimized its claims.

[21] U.K. MOD FOE 2035, p. 13.

[22] Ibid.

[23] This remains a challenge for any bureaucratized, hierarchical organization with longstanding traditions to guide decision-making. However, attracting "out of the box" thinkers will be necessary to achieve these goals.

[24] U.K. MOD FOE 2035, quote from General Ray Odierno U.S. ARMY

[25] USASOC, "Comprehensive Deterrence," Whitepaper, Apr 2016.

[26] Joint Chiefs of Staff, J-7, *Planner's Handbook for Operational Design* (Suffolk: Joint and Coalition Warfighting, 2011) and USASOC, *Planner's Handbook for SOF Operational Design, version 1.9* (Fort Bragg: USASOC HQ, 2013).

[27] The model for Allied Military Government and OSS during and after World War II show the correlative and complementary role both conventional and special operations forces can play in this future.

[28] USASOC White Papers discuss Maneuver in the Cognitive Space, Maneuver in the Narrative Space, and Cyberwarfare.

About the Authors

Kimberly Amerson

Ms. Kimberly Amerson is a career Intelligence Analyst, assigned as the Strategic Intelligence Planner within the DCS, G5 United States Special Operations Command Headquarters. She served as an Intelligence Officer in the United States Air Force and deployed in support of Operation Enduring Freedom and Operation Iraqi Freedom. She has a B.S. from New York University in Political Science, a M.A. from American Military University in Strategic Intelligence and a post-graduate certificate in Counterterrorism.

Spencer B. Meredith III

Spencer B. Meredith III, Ph.D. is currently an Associate Professor in the Joint Special Operations Master of Arts program and the Research Methods Director for the College of International Security Affairs at the National Defense University. He has served as a Fulbright Scholar in the Caucasus in 2007 working on conflict resolution, as well as a subject matter expert for several Department of State public diplomacy programs in South and East Asia. His areas of expertise include religion and peacemaking, democratization and conflict resolution, and Russian/Eastern European and Middle Eastern politics.

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